

Message

From: Norman Bernstein [nwbernstein@nwblc.com]
Sent: 10/7/2021 5:47:51 AM
To: Julie Konzuk [JKonzuk@geosyntec.com]
CC: Ohl, Matthew [ohl.matthew@epa.gov]; Andrew A Gremos [agremos@ramboll.com]; Gary Wealthall [GWealthall@geosyntec.com]; Peter Racher [pracher@psrb.com]; Clabaugh, William B CIV USARMY CELRL (USA) [William.B.Clabaugh@usace.army.mil]; Becker, David J CIV USARMY CEHNC (USA) [Dave.J.Becker@usace.army.mil]; Knox, Corey S CIV (USA) [Corey.S.Knox@usace.army.mil]; Krueger, Thomas [krueger.thomas@epa.gov]; DPetroff [DPetroff@idem.IN.gov]; Hauber, Erin M CIV USARMY CEHNC (USA) [Erin.M.Hauber@usace.army.mil]
Subject: Re: FW: Third Site: Cost benefit analysis of thermally enhanced bioremediation vs. conventional bioremediation
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Matt:

Supplementing Julie's cost up date, cost effectiveness is only one consideration. Another important is implementability. The fact that one of the leading companies using heat to remediate sites declined even to bid because of the risk it sees in mobilizing contamination should also be at least equally compelling.

All the best and stay safe.

Norm

On Wed, Oct 6, 2021 at 10:24 PM Julie Konzuk <JKonzuk@geosyntec.com> wrote:

Matt,

As a further follow up to our call last week regarding the thermally-enhanced bioremediation versus ambient bioremediation, we wanted to provide you with an updated cost comparison between the two options, based on feedback from thermal contractors including the updated capital costs for the thermally-enhanced bioremediation approach (provided in the table below). We've shown the cost differential for two scenarios to illustrate the cost sensitivity to the required duration of treatment, which can't be predicted accurately at this time. We do, however, know that the thermally-enhanced bioremediation will reduce the duration by approximately a factor of 2, which is the basis of the two scenarios.

Remedy	Scenario 1	Scenario 2
Thermally-Enhanced Bioremediation	\$725,000	\$1,023,000
Ambient-Temperature Bioremediation	\$380,000	\$580,000

Where:

- Scenario 1 = 1 injection event for thermally-enhanced bioremediation and 2 injection events for ambient bioremediation
- Scenario 2 = 2 injection events for thermally-enhanced bioremediation and 3 injection events for ambient bioremediation

Please let us know if you have any further questions or comments on our proposal for the DNAPL remedy.

Regards,

Julie

Julie Konzuk, Ph.D., P.Eng. (ON)

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From: Ohl, Matthew <ohl.matthew@epa.gov>
Sent: Wednesday, September 29, 2021 1:17 PM
To: Norman Bernstein <nwbernstein@nwblle.com>
Cc: Julie Konzuk <JKonzuk@Geosyntec.com>; Andrew A Gremos <agremos@ramboll.com>; Gary Wealthall <GWealthall@Geosyntec.com>; Peter Racher <pracher@psrb.com>; Clabaugh, William B CIV USARMY CELRL (USA) <William.B.Clabaugh@usace.army.mil>; Becker, David J CIV USARMY CEHNC (USA) <Dave.J.Becker@usace.army.mil>; Knox, Corey S CIV (USA) <Corey.S.Knox@usace.army.mil>; Krueger, Thomas <krueger.thomas@epa.gov>; DPetroff <DPetroff@idem.IN.gov>; Hauber, Erin M CIV USARMY CEHNC (USA) <Erin.M.Hauber@usace.army.mil>
Subject: RE: FW: Third Site: Cost benefit analysis of thermally enhanced bioremediation vs. conventional bioremediation

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Norm,

Thank you for your question. After discussing this further with USACE, our expectation is that biodegradation of 1,2-dichlorobenzene would be enhanced after heating.

Thank you,

Matt

Matthew J. Ohl
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From: Norman Bernstein <nwbernstein@nwblle.com>
Sent: Monday, September 20, 2021 9:53 AM
To: Ohl, Matthew <ohl.matthew@epa.gov>
Cc: Julie Konzuk <JKonzuk@geosyntec.com>; Andrew A Gremos <agremos@ramboll.com>; Gary Wealthall <GWealthall@geosyntec.com>; Peter Racher <pracher@psrb.com>; Clabaugh, William B CIV USARMY CELRL (USA) <William.B.Clabaugh@usace.army.mil>; Becker, David J CIV USARMY CEHNC (USA) <Dave.J.Becker@usace.army.mil>; Knox, Corey S CIV (USA) <Corey.S.Knox@usace.army.mil>; Krueger, Thomas <krueger.thomas@epa.gov>; DPetroff <DPetroff@idem.IN.gov>

Subject: Re: FW: Third Site: Cost benefit analysis of thermally enhanced bioremediation vs. conventional bioremediation

Matt

Thanks for these. I will let Julie respond. But I do have a question for the Corps. We have 1,2-Dichlorobenze to deal with as one of the Total VOCs. Is 40C enough to treat 1,2-Dichlorobenze?

Norm

On Mon, Sep 20, 2021 at 10:17 AM Ohl, Matthew <ohl.matthew@epa.gov> wrote:

Good morning Julie,

After further thermally enhanced treatment and a comparison and analysis of the results, if ambient temperature bioremediation is selected, we recommend identifying metrics to be met within a certain timeframe (1-2 years) and implementing additional treatment if the metrics are not met. In preparation for our next call here are the initial comments from USACE.

- 1) The costing assumptions (number of injection events, duration of treatment required to reduce concentrations to 4 mg/L, robust ERH heating approach with 7 new electrodes, PCU, etc.) appear biased towards selection of ambient temperature bioremediation. We recommend reaching out to a few vendors for a quote specifically for low temperature systems rather than rely on a cost model that may include traditional ERH systems. Studies of lower wattage heaters have been done by Colorado State as well.
- 2) The risk of DNAPL and dissolved phase mobilization due to enhanced temperature is overstated based on geology of the site. Proper design and implementation of the low-temp ERH system can mediate the risk further by keeping the temp below 40C.
- 3) There is a concern that the time to treat the remaining contamination using ambient temperature bioremediation is underestimated and will be significant. There is also a risk that additional injections are required that are not accounted for in the cost estimate.
- 4) Thermal enhancement maintains the currently prescribed and accepted remedial approach for the Third Site.

Let me know if you have any questions. We have been working with one of the co-authors of the Macbeth et al. 2015 study that was referenced in the report, and can request additional clarification from her if needed.

Thank you,

Matt

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From: Julie Konzuk <JKonzuk@Geosyntec.com>
Sent: Tuesday, August 10, 2021 11:04 PM
To: Ohl, Matthew <ohl.matthew@epa.gov>
Cc: dave.j.becker@usace.army.mil; corey.s.knox@usace.army.mil; Andrew A Gremos <agremos@ramboll.com>; Norman Bernstein <nwbernstein@nwblc.com>; pracher@psrb.com; Gary Wealthall <GWealthall@Geosyntec.com>; Krueger, Thomas <krueger.thomas@epa.gov>; DPetroff <DPetroff@idem.IN.gov>; Clabaugh, William B CIV USARMY CELRL (USA <William.B.Clabaugh@usace.army.mil>
Subject: Cost benefit analysis of thermally enhanced bioremediation vs. conventional bioremediation

Matt,

As discussed during our call on July 15, 2021, we have put together the attached memorandum summarizing the advantages, limitations and potential risks associated with implementing thermally-enhanced bioremediation compared to conventional bioremediation to treat the DNAPL phase encountered at PSGS-11 in the DNAPL Cell at Third Site. We have also included a cost benefit analysis comparing both technologies to support the discussion. As you will see in the attached document, there are additional potential risks of mobilization of mass in unknown ways that we are concerned about when heating DNAPL phase. The cost benefit analysis also demonstrates that any additional benefit in potentially reducing the lifespan of the DNAPL is outweighed by a substantial increases in costs.

We trust that this information helps to support EPA's review of our proposed work plan for BIOREMED hot-spot treatment for breakdown of the DNAPL in the PSGS-11 area in the Third Site DNAPL Cell. We look forward to hearing from you.

Regards,

Julie

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